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2295.00

September 25, 2018

Mr. Sean Greig
Water and Sewer Superintendent
Town of Newmarket
186 Main Street
Newmarket, New Hampshire 03857

Re: 10-Year Water System Capital Improvement Plan
Newmarket, New Hampshire

Dear Mr. Greig:

The Town has had multiple reports completed on the water system over the last decade or so and has requested that Underwood Engineers compile all of the recommendations from those reports into one comprehensive Capital Improvement Plan (CIP) so the Town can develop a financial plan to implement the recommendations. This CIP identifies projects and costs over the next 10 years, as well as identifies recommended projects over the following 10 years (i.e. Years 11 – 20).

The scope of this CIP was to review each of the reports that had been written, list the recommendations that were made (along with the reasoning for the recommendations) in each report, develop a prioritized comprehensive list of all recommendations, and document the findings in a Letter Report.

The following reports were reviewed:

- *Letter Report:* **Water System Computer Model and Capital Improvement Plan**, January 5, 2001, Dufresne-Henry
- *Preliminary Design Report:* **Water Storage and Distribution Improvements**, March 10, 2010, Underwood Engineers
- *Report:* **Water System Update and Capital Improvement Plan**, September 9, 2011, AECOM
- *Technical Memorandum:* **Tucker Well Connection Alternatives**, October 31, 2016, Underwood Engineers
- *Letter Report:* **Water Model Update and Capital Improvement Plan**, June 6, 2017, Underwood Engineers
- *Report:* **Twenty-Year Water and Wastewater System Build-Out Study**, July 2017, Wright-Pierce

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- *Technical Memorandum:* **MacIntosh & Tucker Wells Treatment Evaluation,** April 23, 2018, Underwood Engineers

Newmarket's current water system consists of the following:

Supply:
Bennett Well
Sewall Well
Macintosh Well

Storage:
Great Hill Tank (750,000 gallons)

Distribution:
24.5 miles of Pipe (see ***Table 1 and 2*** below for age and diameter of pipes)
Folsom Drive Booster Pump Station

TABLE 1

PIPE AGE SUMMARY

Date of Installation	Length (feet)	Percent of Overall System	Cumulative Percentage of Overall System
2000 - 2017	25,697	19.8 %	19.8 %
1990's	8,627	6.7 %	26.5 %
1980's	33,160	25.6 %	52.1 %
1970's	23,625	18.2 %	70.4 %
1960's	8,445	6.5 %	76.9 %
1950's	4,682	3.6 %	80.5 %
1940's	2,451	1.9 %	82.4 %
Original (1895)	22,783	17.6 %	100.0 %
TOTAL	129,470		

TABLE 2

PIPE DIAMETER SUMMARY

Pipe Diameter	Length (feet)	Percent of Overall System	Cumulative Percentage of Overall System
16"	6,050	4.7 %	4.7 %
12"	4,237	3.3 %	7.9 %
10"	21,875	16.9 %	24.8 %
8"	57,913	44.7 %	69.6 %
6"	36,423	28.1 %	97.7 %
4"	2,972	2.3 %	100.0 %
TOTAL	129,470		

Pipes that are considered adequate for fire fighting are ≥ 8"

RECOMMENDATIONS

Based upon review of the past reports and through discussions with Town staff, we compiled the below Capital Improvement Plan for the next 10 years. The attached table notes the proposed construction year of each improvement along with an estimated cost for that year:

1. **Upgrade the Bennett and Sewall Well Pump Stations**: These wells and pump stations are essential to the overall supply capacity of the system and have undergone only minor upgrades since they were installed. If one of these wells were required to go offline, the output of the Macintosh Well would have to be reduced as the water from the Macintosh Well currently needs to be blended with water coming from the Sewall and Bennett Wells. The improvements include replacing the chemical feed, electric, heating, ventilation, and some structural improvements.
2. **WTP to Treat Water from the Macintosh and Future Tucker Well**: The treatment of the Macintosh Well is needed so that it can meet the required MCL's and SMCL's as an independent source without the need to blend it with water from the Sewall and Bennett Wells. The Tucker Well is a bedrock supply similar in quantity and quality to the MacIntosh Well that the Town plans to put online in the future by connecting it to the discharge piping from the Macintosh Well. Therefore, the treatment facility would be sized to have the capacity to treat both wells. Please note that the project to develop the Tucker Well and to put it online (including the necessary distribution piping) is included in a project noted below.

3. **South Main Street (Grant Road to Railroad Street)**: Due to the blending requirements of the Macintosh Well and the locations of the Sewall and Bennett Wells, all of the supply water has to pass through this section of pipe. The piping between Grant Road and the High School has flow limitations which reduces the output capacities of all three wells. The portion between the High School and Railroad Street is part of the original 1895 system and is undersized (i.e. 6"). Some reports noted smaller project limits (i.e. from Railroad St. to the High School); however, the project also needs to include the area between the High School and Grant Road to fully remove the current hydraulic bottleneck. By replacing these mains, a major system loop is improved, but not completed (see remainder of the South Main Street project below). The total pipe length would be 3,333' and the recommended size of the new pipe is 12".

4. **New Road (Exeter Road to Great Cove Drive)**: This main experienced a fair number of breaks during the recent past. This main is not part of the original 1895 system, but is still 75 years old. Because there are no looping mains after Young Lane, all of the customers east of Young Lane (including customers on Birch Drive) would be without water during any future main breaks. Currently there are no plans to loop this main; therefore, it will remain as an isolated dead-end branch. The total pipe length would be 1,901' and the recommended size of the new pipe is 12".

5. **Bay Road Area**: This project area is on Bay Road from North Main Street to the Lamprey River Trailer Park. The Town has experienced numerous breaks along this section of piping in the past few years. Additionally, the Moody Point Development plans to extend a line to feed their development due to a supply issue they are having with their well and this main is the sole (dead-end) feed for this area. Pipes along this section of Bay Road are either part of the original 1895 system or installed in the 1940's and are mostly undersized (i.e. 6"). The total pipe length would be 1,423' and the recommended size of the new pipe on Bay Road is 12".

   5A. The pipes on Ham Street and Lamprey Street (Bay Road to Boardman Avenue) could be replaced at the same time as they are directly adjacent to the project noted above. Like the above project, these mains are either part of the original 1895 system or installed in the 1940's and are undersized (i.e. 6"). The total pipe length would be 1,422' and the recommended size of the new pipe is 8".

6. **Water Storage Improvements**: The water system only has one storage tank and it is undersized. This project includes constructing a new 0.75 MG precast/prestressed concrete tank adjacent to the current steel tank and painting the existing steel tank. Since there are two mains that run to the current tank site (one of which is a new 16" main that has been run from the tank site to the downtown area in the past few years in anticipation of this tank), this is an ideal location for a new tank. Because the Town-owned property is too small to construct the second tank on, the Town would have to obtain additional land (ideally adjacent to the current tank site). In addition to increased storage, the new tank is needed to provide storage when the existing tank is taken offline for painting.

7. **Construct the Tucker Well Pump Station**: This project includes piping to connect the well, that has already been constructed, to the distribution system and it would provide the Town with supply flexibility in case one or more of the other existing wells is down for maintenance. This well would be tied into the treatment facility that in noted above for the MacIntosh Well.

Improvements that are proposed after the above-noted 10-year Capital Improvement Plan are noted below (i.e. in Years 11-20 or 2029-2038). These improvements are roughly in order of importance, but the order should be reviewed again near the end of the current 10-year Capital Improvement Plan. Descriptions of the projects have been omitted.

8. Elm Street water main replacement from Packers Falls Road to Nichols Avenue.
9. South Main Street water main replacement (Main Street to Gerry Avenue). This would also include Gerry Avenue and Maple Street (369' from South Main Street).
10. Creighton, Short, Prescott, and Mount Pleasant Streets and Tasker Lane water main replacement.
11. Spring Street area water main replacement. This would include mains on Spring Street, Central Street, Chapel Street, Elkins Street, Church Street, and South Street.
12. Exeter Road area water main replacement. This would include the following areas:
    a. Exeter Road (Ash Swamp Road to Daybreak Drive)
    b. Exeter Road (Firefly Landing to Lita Lane)
    c. Exeter Road (Lita Lane to Hersey Lane)
    d. Hersey Lane (from Exeter Road to Brendan Drive)
    e. Ash Swamp Road (from Exeter Road to the Rockingham Junction)
13. Paint the existing steel water storage tank.
14. Exeter Road water main replacement from Hersey Lane to the cross-country line to the tank site.
15. Packers Falls Road water main replacement from South Main Street to the Water Treatment Plant. An option for this project is to line the inside of the pipe due to its relative larger diameter. Before the lining option is undertaken, tests should be performed to determine the pipes wall thickness and maintenance records should be reviewed in reference to pipe repairs to determine if lining is a viable option.

Once all of the above-noted projects have been completed, all of the original 1895 pipe and all of the pipe installed between 1895 and 1949 will have been replaced with the exception of the Packer Falls main (from the water treatment plant to South Main Street); therefore, the oldest main would be from the 1950's.

We hope that this Capital Improvement Plan meets your needs for future planning. We also recommend that the Plan be updated in approximately 8 years in order to ensure that it remains current.

Please call if you have any questions.

Very truly yours,

UNDERWOOD ENGINEERS, INC.

Peter J. Pitsas, P.E.
Project Manager

PJP/
Encl.

cc: Keith Pratt, UE (w/ encl.)

10-YEAR WATER SYSTEM CAPITAL IMPROVEMENT PLAN

NEWMARKET, NEW HAMPSHIRE

RANK	PROJECT	Main Replacement Length	Current Anticipated Constr. Year	Estimated Cost in Constr. Year *
1	**Supply:** Upgrade the Bennett and Sewall Wells	--	2019	$1,500,000
2	**Supply:** WTP to Treat Water from the Macintosh and Tucker Wells	--	2019	$3,870,000
3	**WM Replacement:** South Main Street (Railroad St. to Grant Rd.)	3,333	2020	$1,150,000
4	**WM Replacement:** New Road (Exeter Rd. to Great Cove Dr.)	1,901	2020	$660,000
5	**WM Replacement:** Bay Road (North Main St. to Lamprey River Mobile Home Park)	1,423	2022	$520,000
5A	**WM Replacement:** Ham and Lamprey Streets	1,422	2022	$520,000
6	**Storage:** New Water Storage Tank	--	2027	$2,170,000
7	**Supply:** Construct the Tucker Well		2027	$3,400,000
8	**WM Replacement:** Elm Street	2,914	2032	$1,430,000
	PROJECTS FOR THE NEXT 10-YEAR PERIOD			
9	**WM Replacement:** South Main Street (Main St. to Gerry Ave.) Gerry Avenue Maple Street (first 369' from South Main St.)	1,612	2032	$790,000
10	**WM Replacement:** Creighton Street Short, Prescott, and Mt. Pleasant Streets Tasker Lane	1,384	2032	$680,000
11	**WM Replacement:** Spring Street Neighborhood (Spring, Central, Chapel, Elkins, Church, and South Streets)	3,917	2032	$1,930,000

10-YEAR WATER SYSTEM CAPITAL IMPROVEMENT PLAN

NEWMARKET, NEW HAMPSHIRE

RANK	PROJECT	Main Replacement Length	Current Anticipated Constr. Year	Estimated Cost in Constr. Year *
12	**WM Replacement:** Exeter Road (Ash Swamp Rd. to Daybreak Dr.) Exeter Road (Firefly Landing to Lita Ln.) Exeter Road (Lita Ln. to Hersey Ln.) Hersey Lane (from Exeter Rd. to Brendan Dr.) Ash Swamp Road and Route 108	3,464	2037	$1,970,000
13	**Storage:** Paint Existing Water Storage Tank	--	2037	$800,000
14	**WM Replacement:** Exeter Road (Hersey Ln. to Tank Line)	2,870	2037	$1,640,000
15	**WM Replacement:** Packers Falls Road (South Main St. to WTP)	2,982	2037	$1,700,000
	TOTALS	**27,222**		**$24,730,000**